Deciphering the nitrate signaling pathway leading to a reduction of primary root growth in Medicago truncatula

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Mots-clés	nitrate signal [8], Nox Documents [9], peroxidase [10], primary root [11], Ros [12], SOD [13]
Résumé en anglais	In the model legume Medicago truncatula, nitrate has been shown to inhibit primary root growth through the reduction of root cell elongation. Nitrate, as an essential nutrient, also acts as a signal molecule that is sensed and transduced through a nitrate transporter MtNPF6.8, with RNAi mutants deficient in MtNPF6.8 being insensitive to nitrate [1, 2]. We tested here whether reactive oxygen species (ROS) could be downstream mediators of the nitrate signal since ROS are able to transduce ABA signal in other contexts and also govern the primary root growth. Thus, we analyzed the distribution of ROS (H2O2, O2•−, •OH) and peroxidase activity all along the primary root of seedlings sensitive or insensitive to nitrate using different genotypes of M. truncatula, three wild types and a npf6.8RNAi mutant grown with or without nitrate, to determine whether nitrate modifies ROS and peroxidase patterns. We found that nitrate modified the morphology of the root tip, induced an increase in H2O2, and a decrease in O2•− and •OH in seedlings sensitive to nitrate (R108, A17, and DZA315-16), but not in seedlings insensitive to nitrate (npf6.8RNAi mutant). These results suggest that ROS and peroxidases are downstream mediators in the nitrate signaling pathway. The origin of the change in ROS accumulation in response to nitrate was further investigated following the activity of major enzymes (peroxidase, SOD, Nox) able to interfere with ROS accumulation.
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